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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

TRENTON

water pollution control plant

DIVISION OF PLANT OPERATIONS
Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Trenton Local Advisory Committee,
Town of Trenton.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Trenton Water Pollution Control Plant, OWRC Project No. 57-S-4.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager.

ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MacDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Trenton Water Pollution Control Plant, OWRC Project No. 57-S-4.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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TRENTON

water pollution control plant

operated for

THE TOWN OF TRENTON

by the

ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'65 REVIEW

A total of 214.9 million gallons of sewage was treated in 1965 at a cost of $19,519.33. The cost of treatment per million gallons of sewage was $90.82, a slight reduction from 1964.

The average daily flow of waste to the treatment plant in 1965 was 590,000 gallons per day, which was an increase from 504,000 gpd in 1964. The average strength of waste increased in 1965 to 315 ppm BOD from 189 ppm BOD in 1964.

During 1965, 160,000 cubic feet of raw sludge were pumped to the digesters and 20,180 cubic feet of digested sludge were removed for land disposal.

In 1965 the following equipment was rebuilt: the chlorinator, the sewage gas meter, the blower in the control building, and the No. 1 pump in the Dundas Street pumping station.

The plant site was landscaped by Hollandale Nurseries to conform with the Town's Centennial project, which is west of the plant. A retaining wall was constructed by the Town Works Department at the Dundas Street Pumping Station to protect the bank from erosion.

The efficiency of the treatment process was satisfactory for a primary treatment plant.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY
1956 - 1965

INCEPTION

In 1956, the Town of Trenton and the Ontario Water Resources Commission initiated plans for the construction of a modern sewage treatment plant.

The firm of Gore & Storrie Limited, Toronto, Ontario, Consulting Engineers was engaged to prepare plans and specifications for the project.

APPROVAL

In 1957, the town signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

The construction of the project began in the spring of 1959. The plant was constructed by Bradford-Hoshal Associates Limited of Port Hope, Ontario and the Dundas Street pumping station was constructed by Bedford Construction Company of Toronto. By January 1960, the project was completed and the Division of Plant Operations began the operation of the project.

TOTAL COST

$515,665



J. STEWART
CHIEF OPERATOR

Project Staff

D. Herrington,
Operator

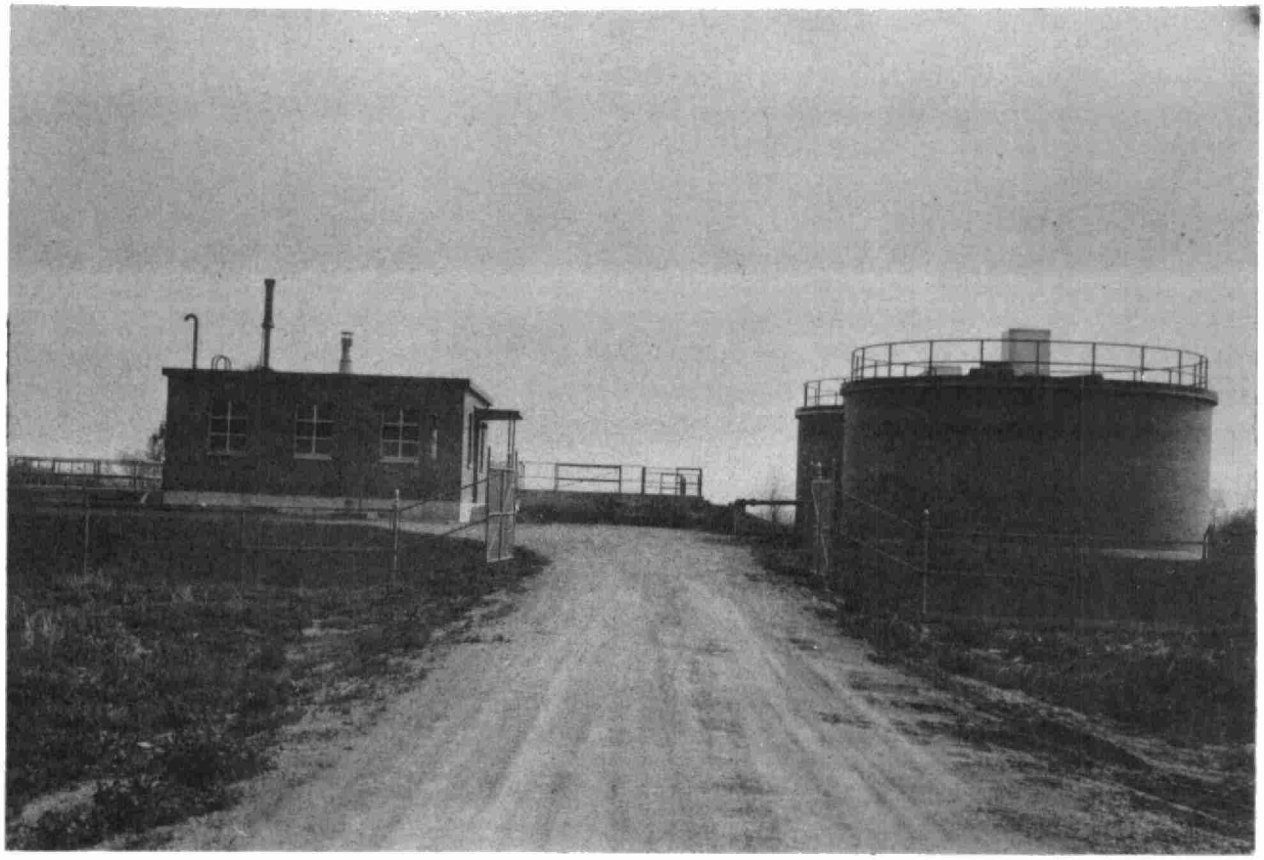
COMMENTS

During the year the Trenton Water Pollution Control Plant was staffed by two men. The plant was supervised eight hours per day, Monday through Friday, and several hours on Saturday and Sunday.

Mr. D. Herrington was hired as an operator on May 10, 1965. One half of his working time was spent at the Trenton plant and the other at the Village of Batawa treatment plant.

Mr. Stewart attended the Chief Operators' Conference held at the OWRC laboratory. Mr. Stewart and Mr. Herrington were enrolled in a gas fitters' course offered by the Department of Energy and Resources management. Both operators successfully completed the course and were designated certified gas fitters.

The operators should be complimented for their enthusiasm and interest in the operation of the plant.



Description of Project

GENERAL

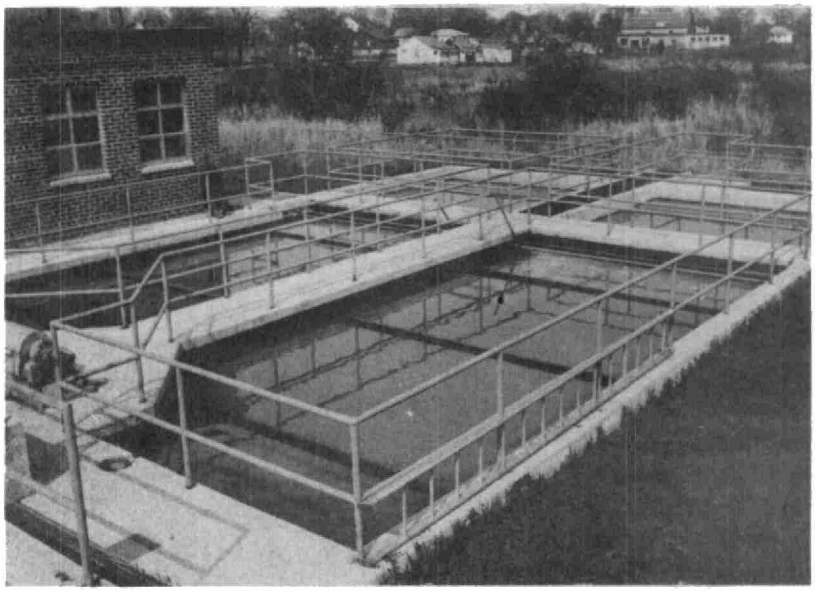
The waste from the west side of the Trent River is conveyed under the river via a 24 inch concrete gravity sewer to the Dundas Street pumping station. Similarly, the waste from the east side of the Trent River is conveyed to the pumping station wet well via a 24 inch concrete sewer entering the north wall of the building.

From the Dundas Street pumping station, the waste is transported to the treatment plant by a 16 inch force main.

INFLUENT WORKS

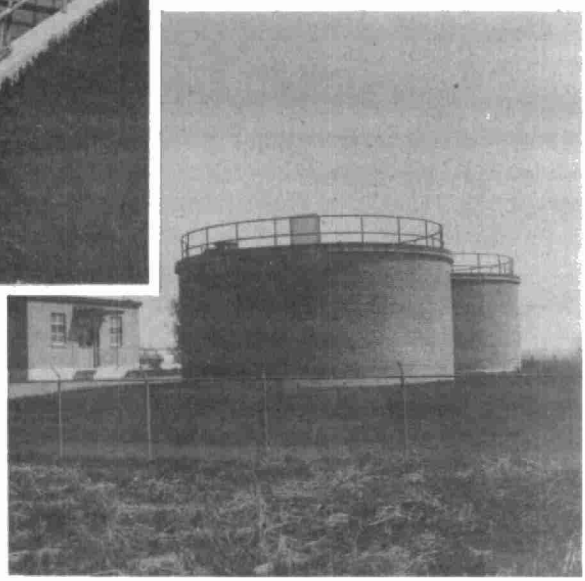
Before the sewage enters the influent works, it passes through a Builders-Providence, Inc. venturi meter, where all flow to the plant is measured. The sewage next enters the inlet chamber of the influent works and is there directed through a 24 inch sluice gate to the aerated grit chamber.

Compressed air is forced into the grit chamber in such a manner as to impart a roll to the tank contents. The velocity of the roll is controlled so that the organic material stays in suspension and passes through the grit chamber. The grit material is lifted by a four inch air pump into a decanting trough where the



LEFT: PRIMARY SEDIMENTATION TANKS

BELOW: DIGESTERS



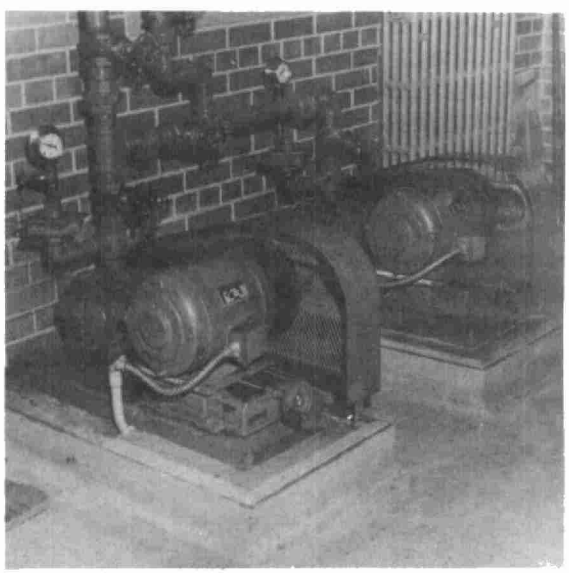
liquid and solid phases are separated. The washed grit is normally removed from the decanting trough and disposed of as sanitary land fill.

PRIMARY SEDIMENTATION TANKS

Two rectangular primary sedimentation tanks, 52 feet in length, receive the sewage from the grit removal unit. It is retained in the sedimentation tanks for approximately three hours at design flow. Approximately 50 percent of the suspended solids in the incoming sewage settles to the bottom of the sedimentation tanks. Each sedimentation tank is equippped with a sludge scraper which moves the settled sludge to a hopper located at the front end of the tank. The sludge is then pumped automatically at a pre-set interval to the digestion tank.

SLUDGE DIGESTION TANKS

The Trenton plant utilizes two stage digestion. There are two digesters, one secondary tank of 28 feet in diameter. The piping to the digesters is so arranged that raw sludge can be pumped to either tank and digested sludge can also be removed from either tank.



AIR BLOWERS

Both digesters have fixed covers. The primary digester contents are mixed with compressed digester gas and also circulated through a Pacific flush tank heat exchanger.

PROJECT COSTS

NET CAPITAL COST (Final) Long Term Debt to OWRC	$515,665.11
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	$ 73,037.39
Net Operating	$ 19,519.53
Debt Retirement	10.406.00
Reserve	2,536.23
Interest Charged	28,932.44
TOTAL	$ 61,394.20

RESERVE ACCOUNT

Balance at January 1, 1965	$ 21,687.16
Deposited by Municipality	2,536.23
Interest Earned	1,255.16
Less Expenditures	-
Balance at December 31, 1965	$ 25,478.55

MONTHLY OPERATING COSTS

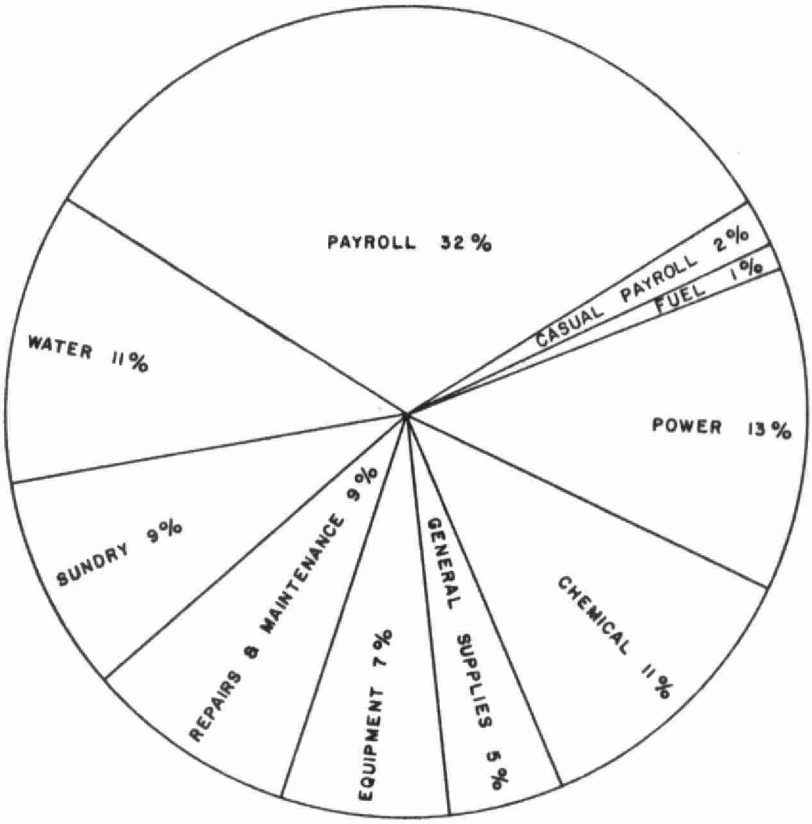
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	382.76	301.94					26.82	40.38		13.62	
FEB	1340.15	340.10		72.62	192.31	448.05	30.83		12.03	57.82	186.39
MARCH	1600.08	318.50	78.36		208.34		46.93		144.31	608.36	195.28
APRIL	1587.05	434.39	156.14		209.82	448.05	71.57			92.79	174.29
MAY	1371.37	552.10	99.24		223.93		105.65	94.00	80.00	39.32	177.13
JUNE	1606.36	517.53			223.55	448.05	160.62	28.74		62.97	164.90
JULY	1440.18	399.69	30.00		209.23		52.80	126.38	421.70	33.02	167.36
AUG	1285.93	317.05			207.66		145.54	307.79	38.37	96.06	173.46
SEPT	1635.61	516.23	24.00		213.10	448.05	47.07		83.38	76.67	272.11
OCT	1623.56	750.00	12.00		198.82		20.75	17.41	399.13	39.57	185.88
NOV	2610.65	689.62		71.18	224.42	448.05	120.05	763.20	80.70	31.12	182.11
DEC	3035.83	1161.59		74.64	440.90		159.53		411.38	519.29	268.50
TOTAL	19519.53	6298.74	399.74	218.44	2552.08	2240.25	988.16	1377.90	1676.00	1670.81	2097.41

YEARLY OPERATING COSTS

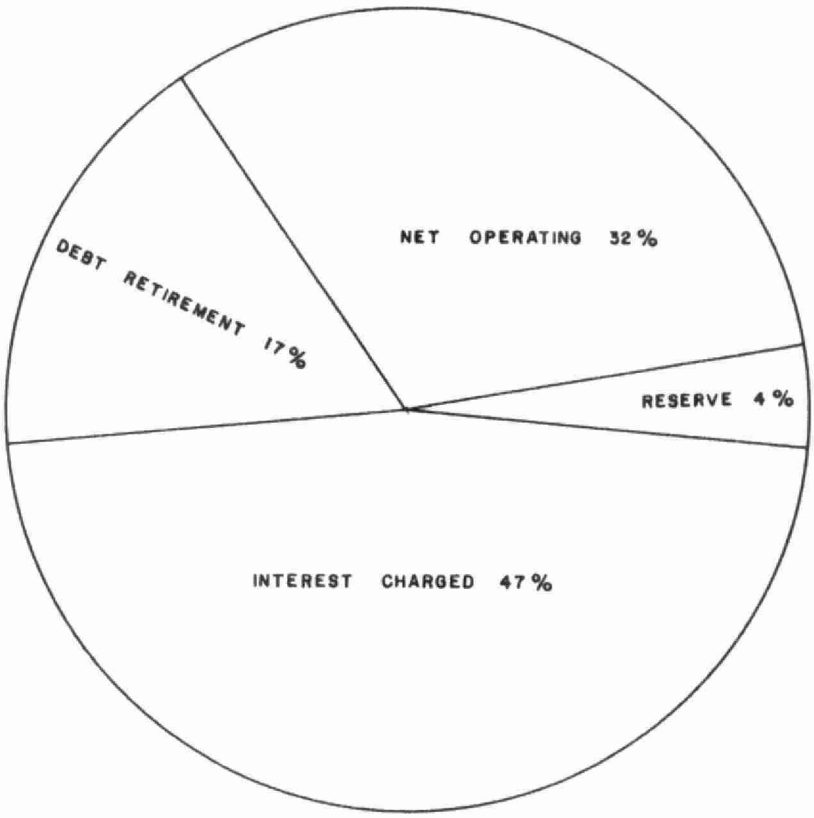
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	496.00	$ 12,577.44	* 3.70	25.35	2.5 CENTS
1963	384.00	$ 12,104.42	3.59	31.52	5.0 CENTS
1964	184.25	$ 18,422.16	5.19	99.98	12.5 CENTS
1965	214.87	$ 19,519.53	5.38	90.84	5 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1965 OPERATING COSTS

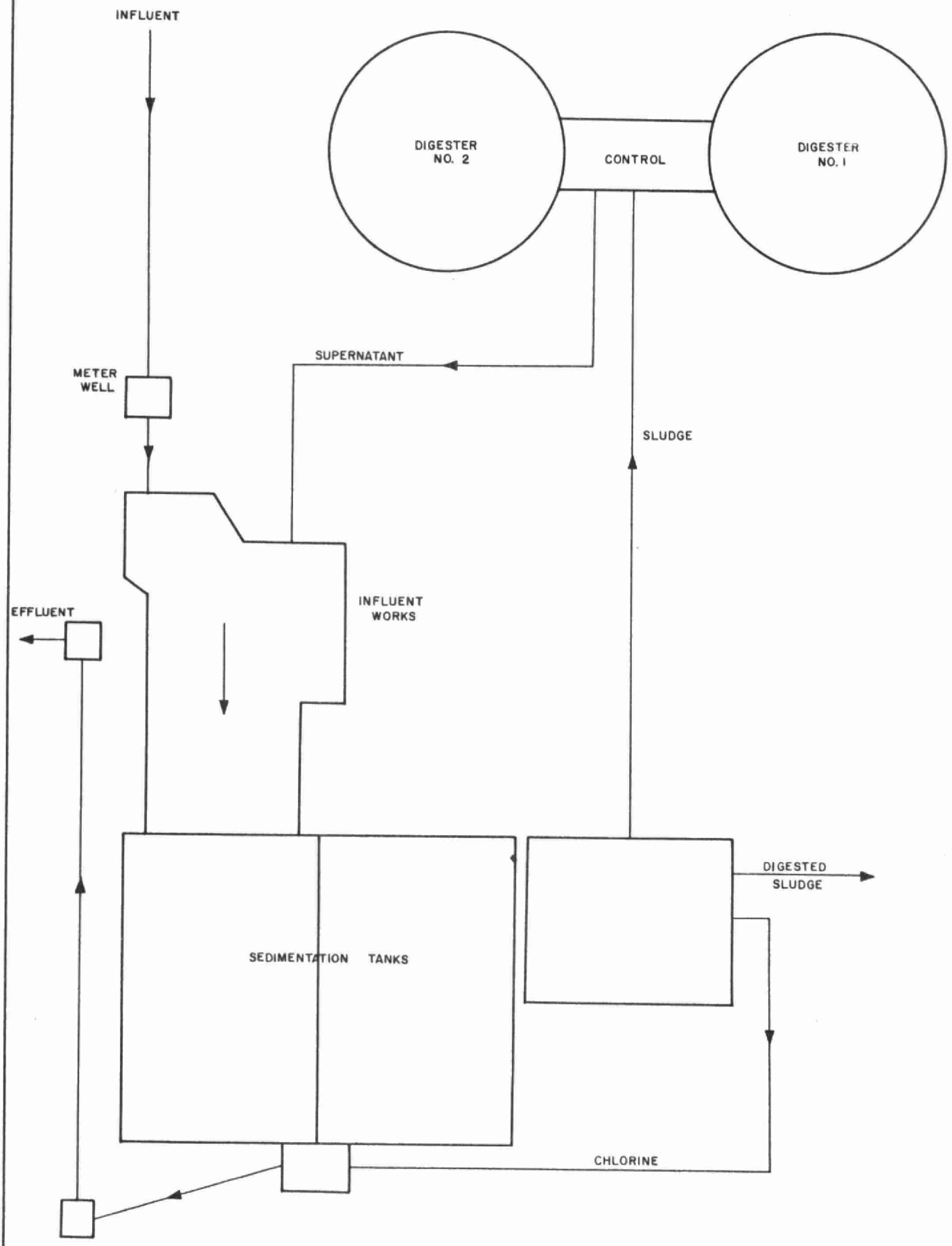


TOTAL ANNUAL COST



Technical Section

GENERAL LAYOUT OF TRENTON PLANT



Design-Data

GENERAL

Type of Plant - Primary treatment with provision for the extension to complete treatment.

Design Population - 12,000 persons. 15,000 persons when extended to complete treatment.

Design Plant Flow - 83.3 gallons per capita per day or 1.0 million gallons per day.

Five Day BOD -

Raw Sewage	-	250 PPM
Removal	-	35%

Suspended Solids -

Raw Sewage	-	200 PPM
Removal	-	55%

PRIMARY TREATMENT

Grit Removal

Aerated grit chamber with four inch air pump to remove grit from hopper into decanting trough.
One unit - 10' x 9' x 8'6"
Volume - 765 cu. ft. or 4775 Imperial gallons.

Screening

Bar screen on by-pass channel.

Primary Sedimentation Tanks

Two rectangular units - size 52' x 16' x 12'.

Volume - 20,000 cu. ft. or 125,000 gallons (total).

Retention at Design - 3.0 hours.

Surface Settling Rate - 600 gallons per square foot per day.

Weir Overflow Rate - 8340 gallons per lineal foot of weir per day.

Sludge Collectors - Jeffery Manufacturing Company Limited.

Longitudinal Sludge Collectors - Manually operated scum trough.

OUTFALL WORKS

850 feet of 30 inch concrete pipe.

The outfall sewer also acts as a chlorine contact chamber.

DIGESTION SYSTEM

Two cylindrical units - 28 feet in diameter and 23 feet high.

Volume - 27,000 cubic feet.

Digester Loading - 2.25 cubic feet per capita.

1.31 pounds of solids per cubic foot per month.

Primary digester contents agitated by gas recirculation.

DUNDAS STREET PUMPING STATION

Unit No. 1 - 15 HP Westinghouse motor.

Fairbanks Morse pump - 700 IGPM @ 39 TDH.

Unit No. 2 - 40 HP Westinghouse motor.

Fairbanks-Morse pump - capacity 1740 IGPM @ 48 TDH.

Unit No. 3 - Cummins diesel motor BHP 85 @ 1800 RPM.

Fairbanks-Morse pump - capacity 3130 IGPM @ 687 TDH.

Process Data

PROBABILITY PLOT

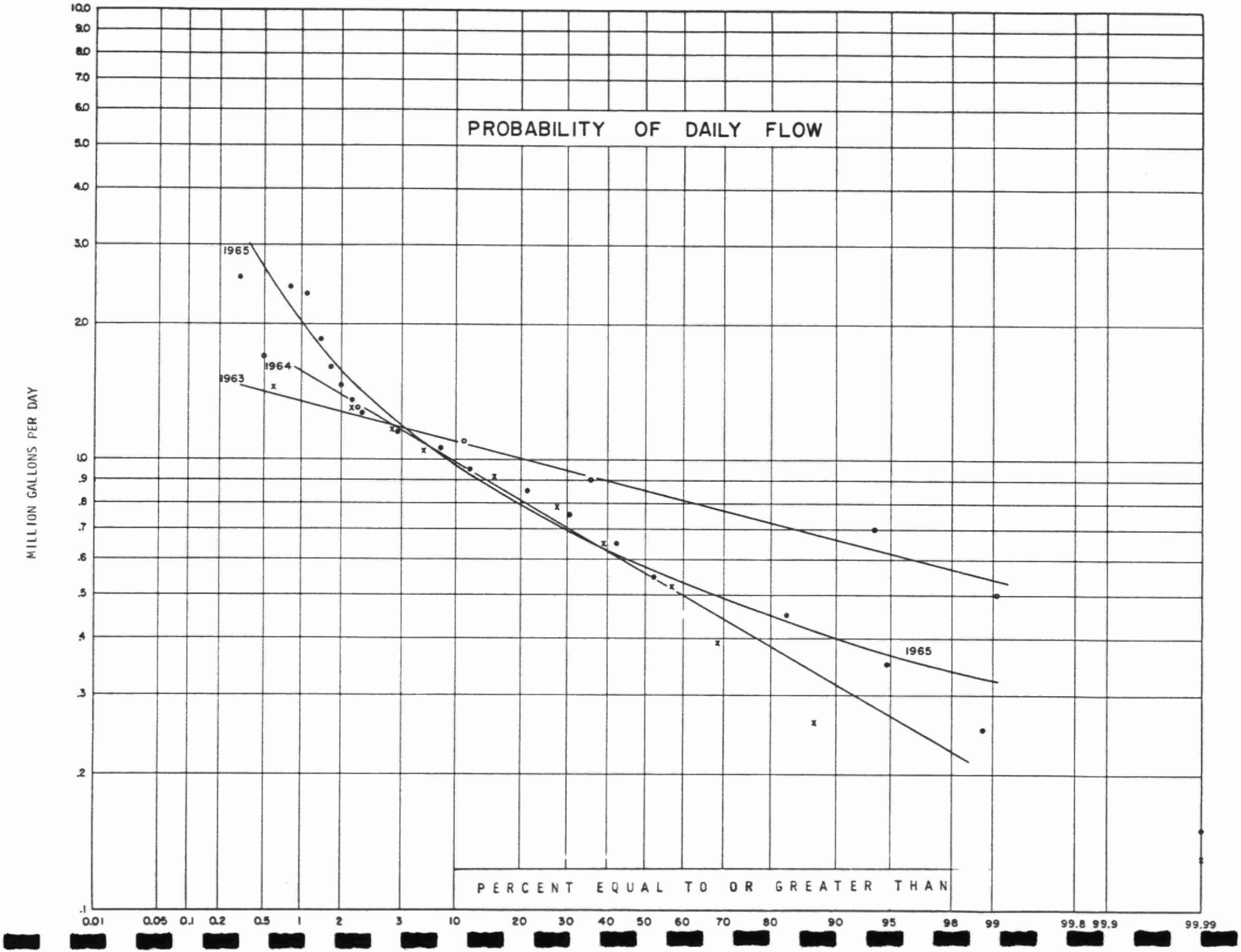
The flow to the plant exceeded the design flow of 1 mgd approximately 10 percent of the time in 1965. Approximately 50 percent of the time, the flows to the plant were equal to or greater than 580,000 gpd.

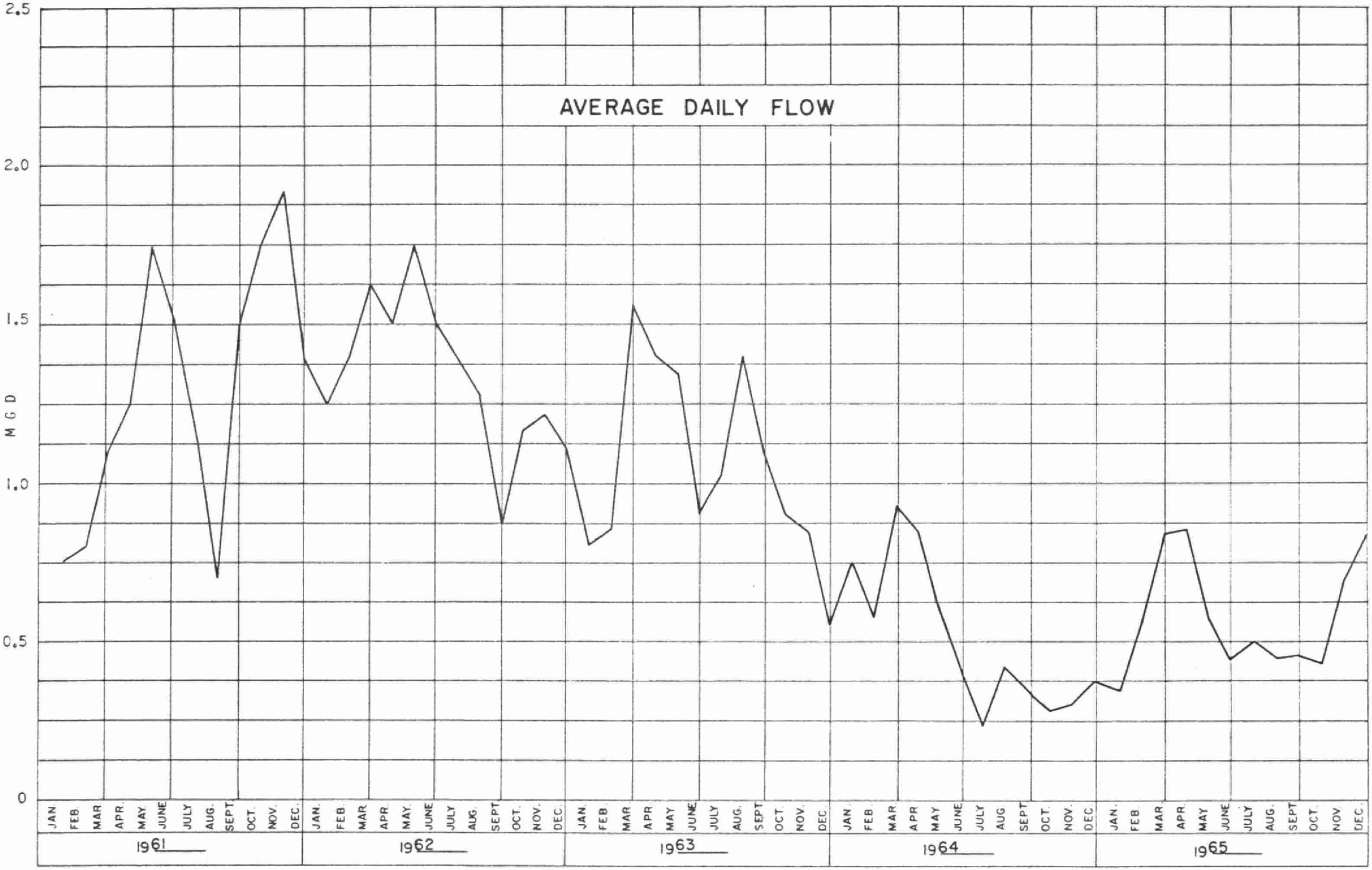
DAILY FLOWS

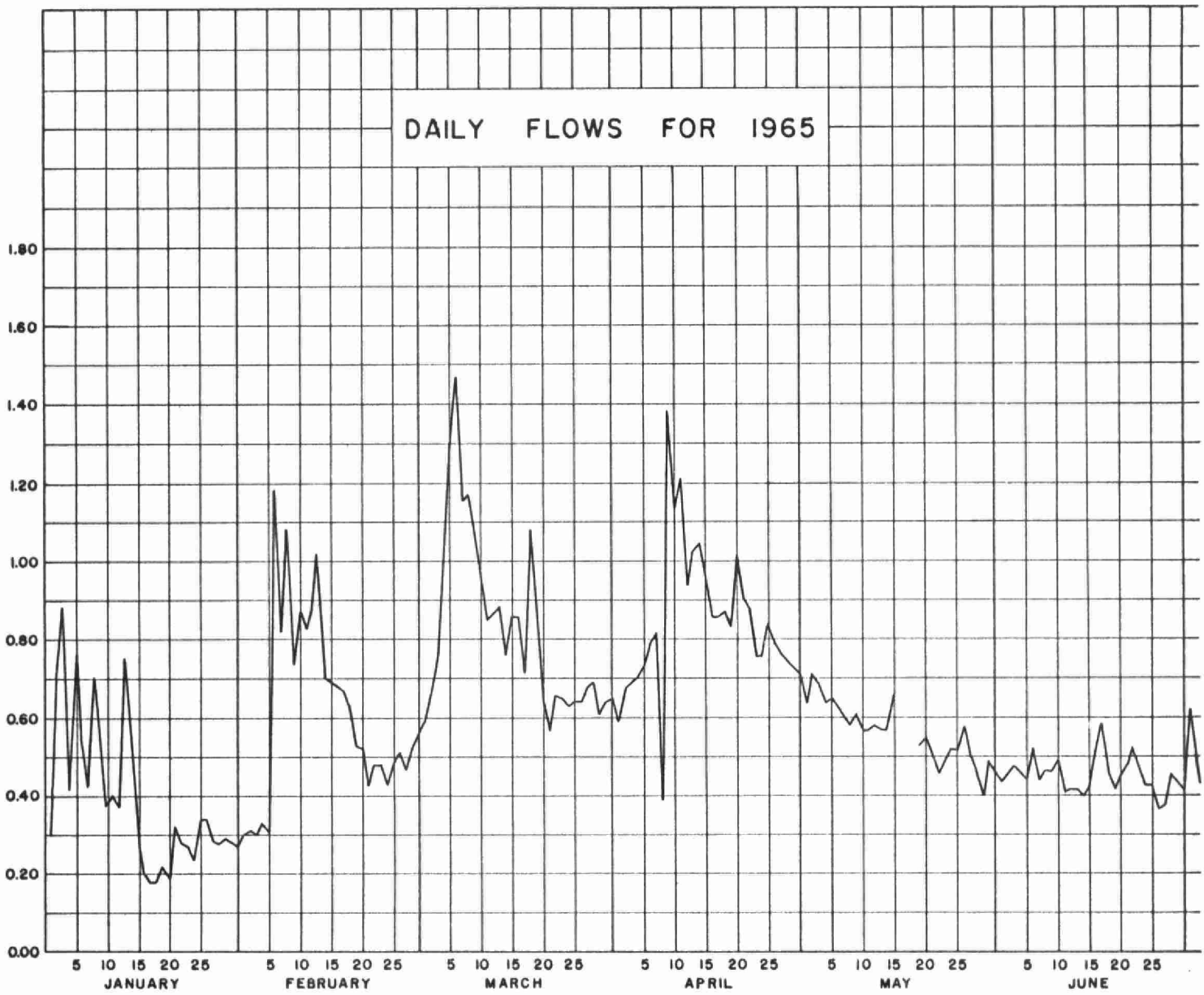
The average daily flow to the plant in 1965 was 588,000 gpd. It should be observed from the daily flow plot that peaks exist in January, February, March and April and also in November and December. These peaks are due to storm water entering the sanitary sewer system. The flow meter was inoperative the latter part of October.

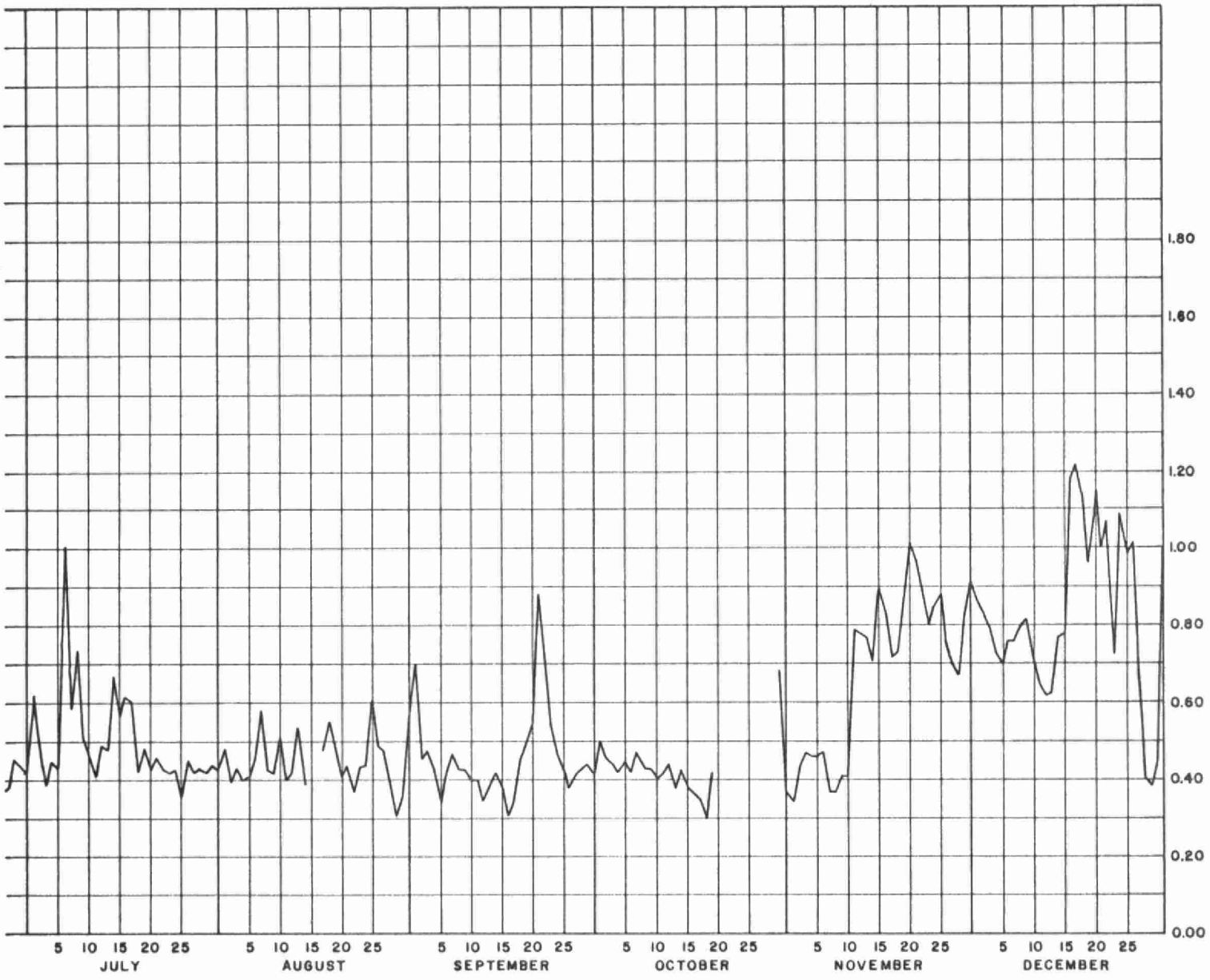
AVERAGE DAILY FLOW

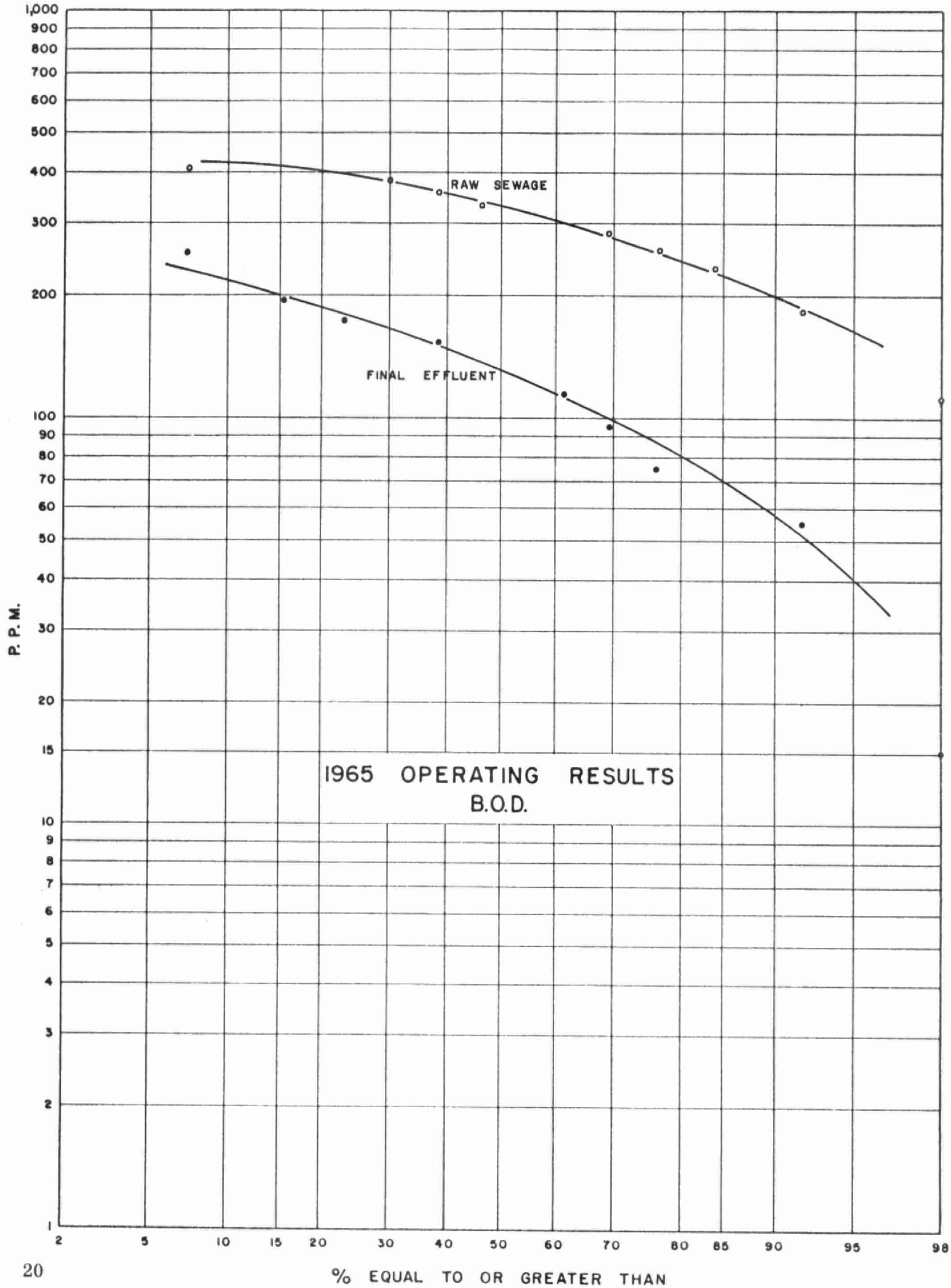
It should be observed from the average daily flow plot that the flows to the plant have decreased considerably since the plant was initially started.

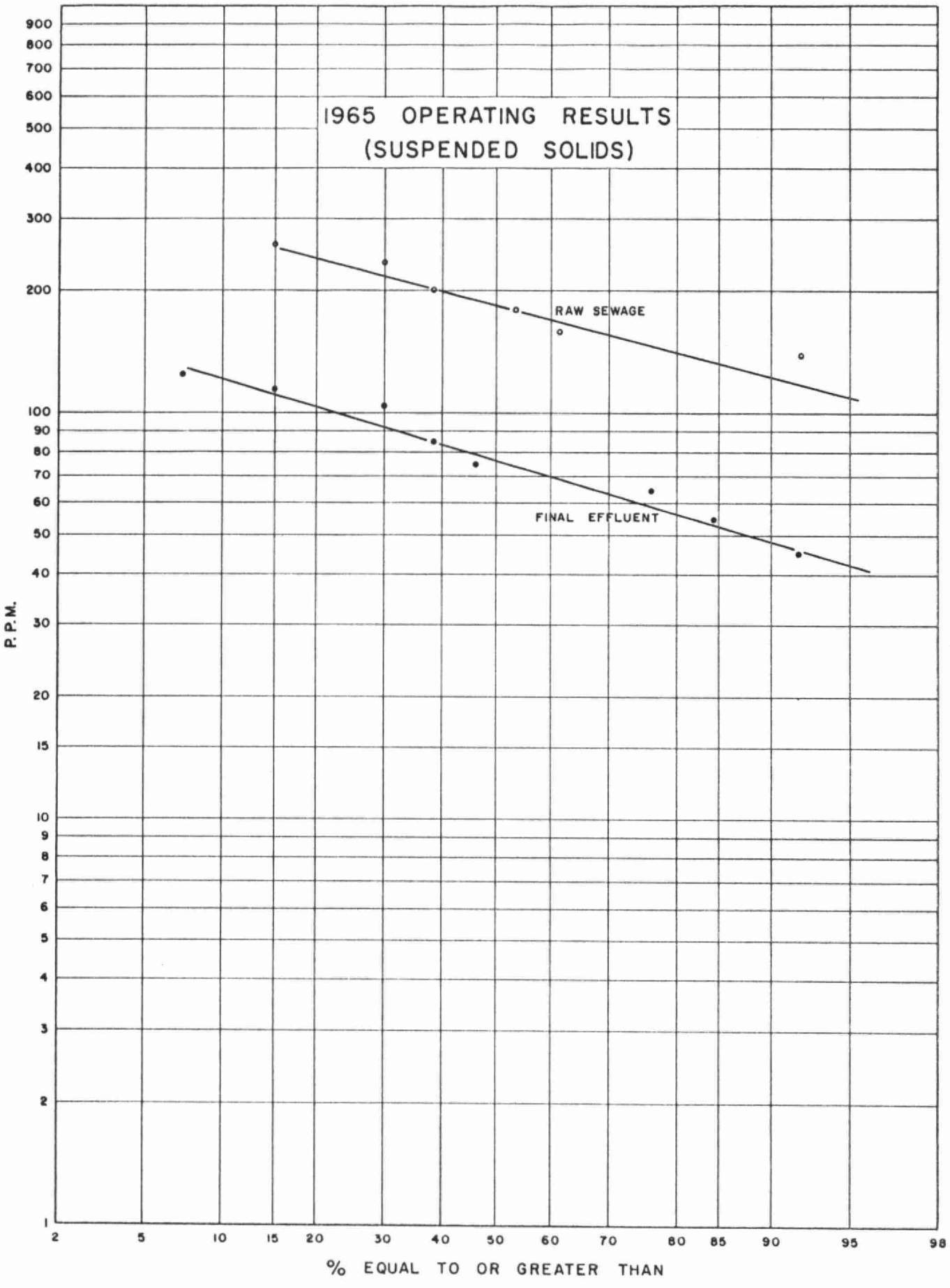

PROBABILITY OF DAILY FLOW
MILLION GALLONS PER DAY
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
1965
1964
1963
1965
PERCENT EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
3
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

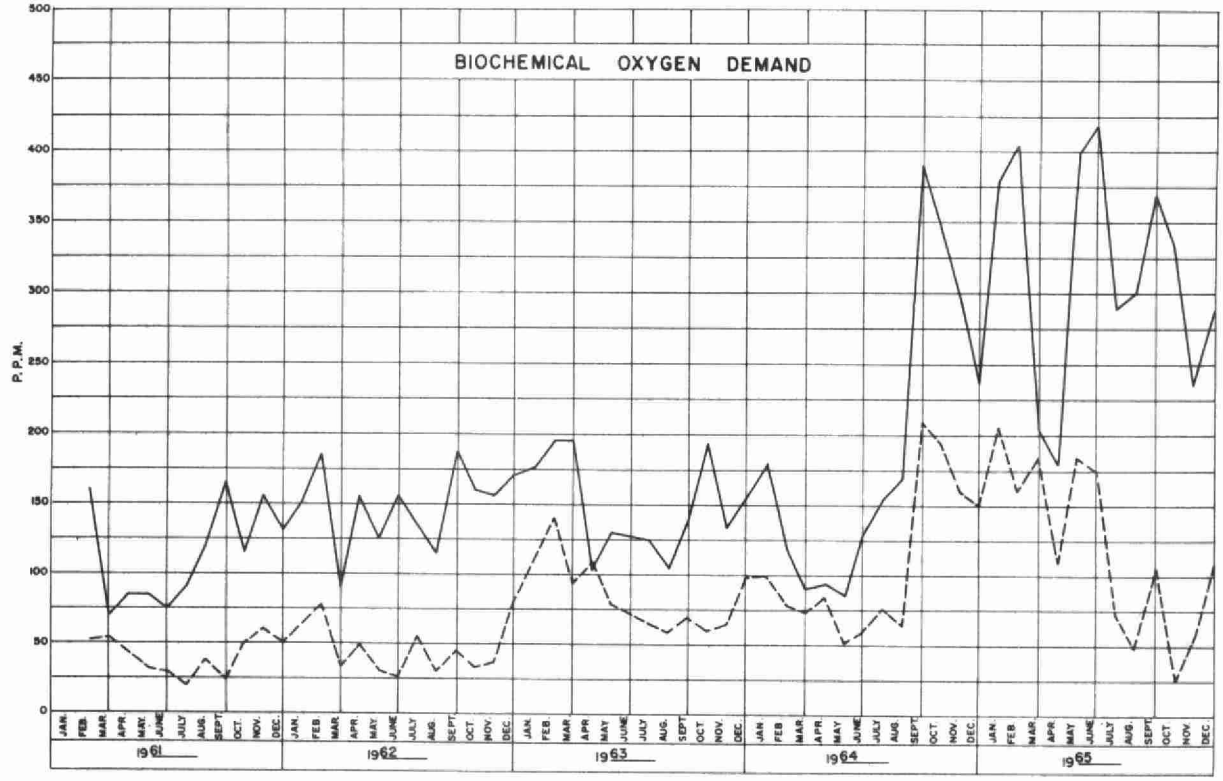

AVERAGE DAILY FLOW
2.5
2.0
1.5
1.0
0.5
0
M G D
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1961
1962
1963
1964
1965


DAILY FLOWS FOR 1965
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
5 10 15 20 25
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE

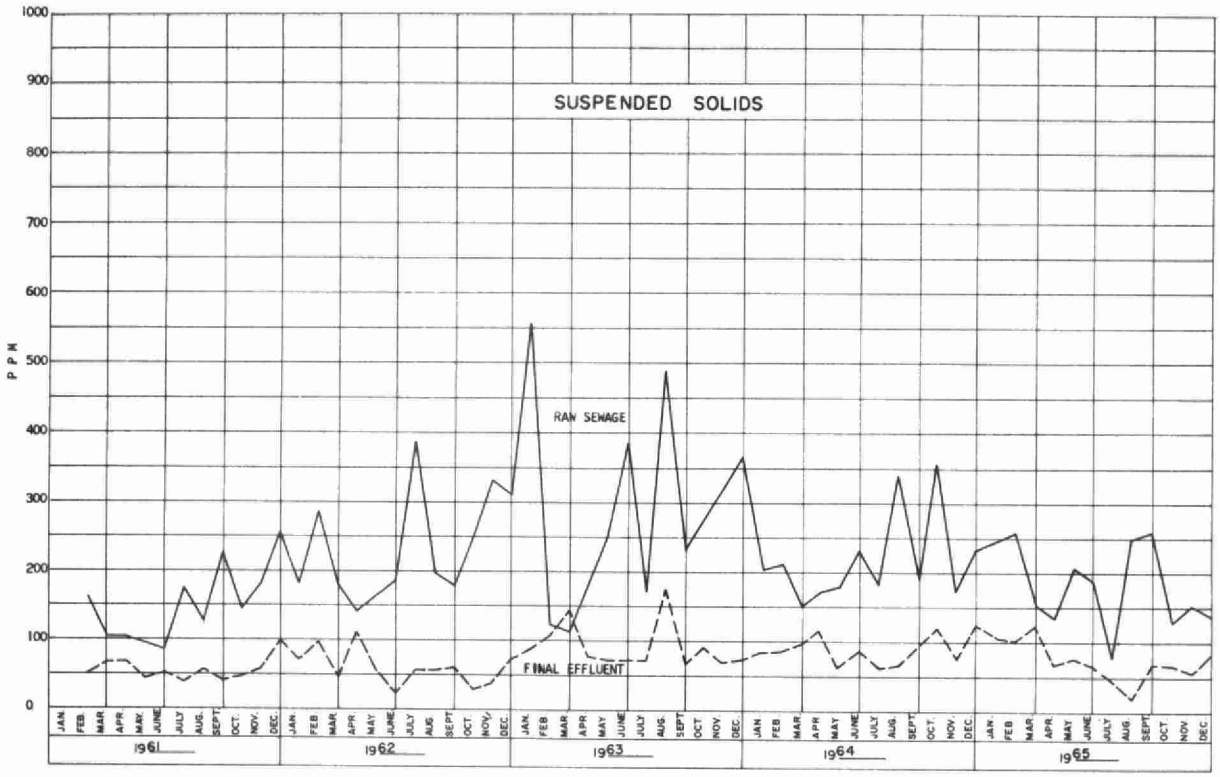

1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
5 10 15 20 25
JULY
5 10 15 20 25
AUGUST
5 10 15 20 25
SEPTEMBER
5 10 15 20 25
OCTOBER
5 10 15 20 25
NOVEMBER
5 10 15 20 25
DECEMBER


1,000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
P. P. M.
RAW SEWAGE
FINAL EFFLUENT
1965 OPERATING RESULTS
B.O.D.
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% EQUAL TO OR GREATER THAN


1965 OPERATING RESULTS
(SUSPENDED SOLIDS)
RAW SEWAGE
FINAL EFFLUENT
P.P.M.
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
30
20
15
10
9
8
7
6
5
4
3
2
1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
% EQUAL TO OR GREATER THAN



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

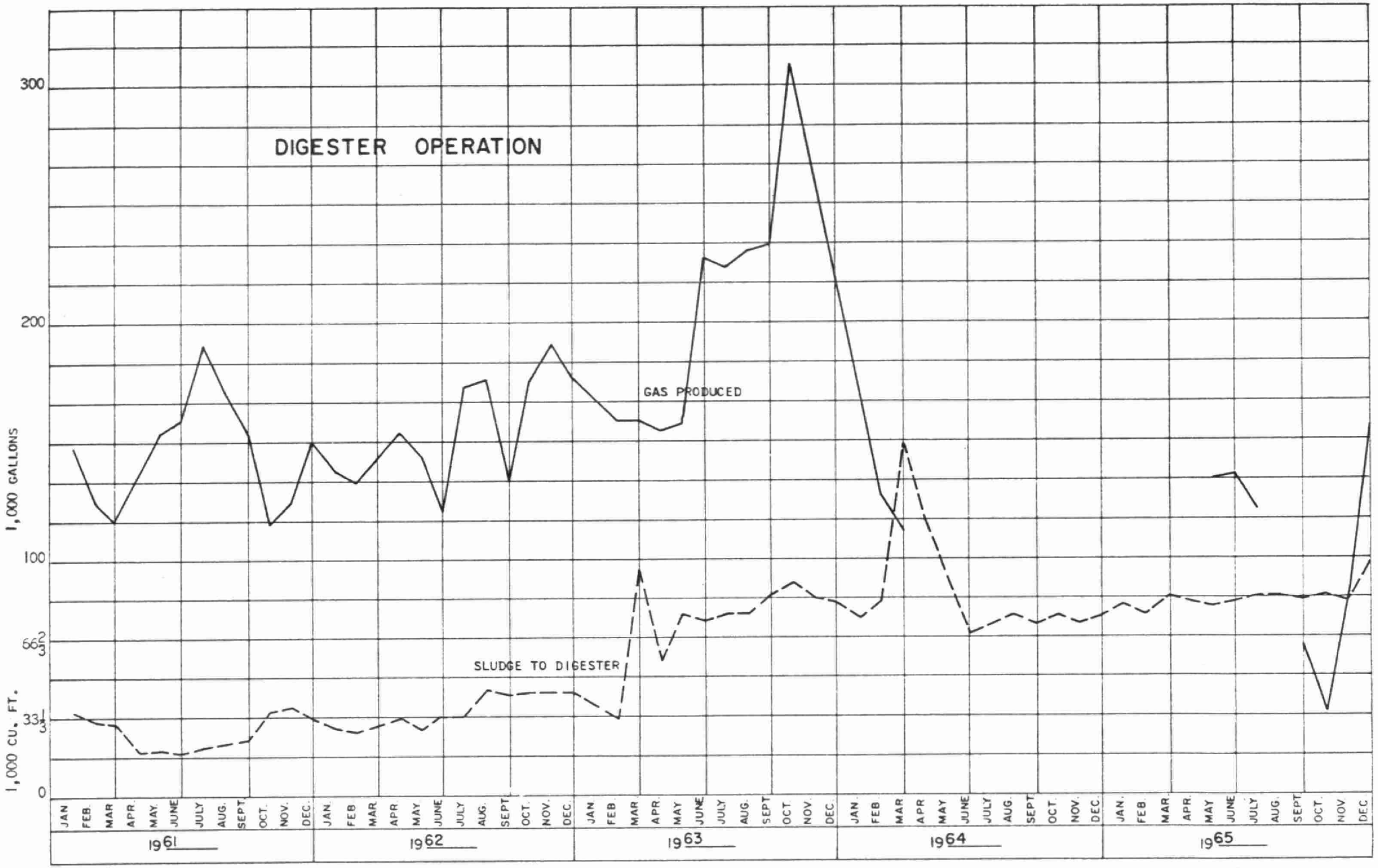
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	380	205	46.0	10.7	244	107	67.0	8.4	18
FEB.	405	160	60.5	21.0	258	101	61.0	13.5	90
MAR.	206	183	11.0	2.9	157	123	21.5	4.4	85
APR.	180	86	52.0	12.1	137	69	49.5	8.8	55
MAY	400	185	53.5	19.0	207	77	63.0	11.5	29
JUNE	420	150	64.0	18.4	186	66	64.5	8.2	96
JULY	285	74	74.0	16.3	73	43	41.0	2.3	114
AUG.	300	48	84.0	17.6	250	20	92.0	16.1	126
SEPT.	370	106	71.5	18.2	260	70	73.0	13.1	44
OCT.	335	25	92.5	20.5	137	69	49.5	4.5	134
NOV.	235	56	76.0	18.4	151	57	62.0	9.6	66
DEC.	260	110	57.5	19.2	140	82	41.5	7.4	53
TOTAL	-	-	-	213.8	-	-	-	117.1	910
AVG.	315	116	63.0	17.8	183	74	59.5	9.8	76

COMMENTS

The waste received at the Trenton plant during 1965 had an average 5 day BOD concentration of 315 ppm and an average suspended solids concentration of 183 ppm. The treatment plant received approximately 63% of the BOD and 60% of the suspended solids.

The average monthly grit removal was 76 cubic feet. This is a slight increase from 1964 and could be due to the wet conditions.

The efficiency of the treatment process was within accepted standards of a primary treatment plant.


DIGESTER OPERATION
GAS PRODUCED
SLUDGE TO DIGESTER
1,000 GALLONS
1,000 CU. FT.
300
200
100
66⅔
33⅓
0
JAN FEB MAR APR MAY JUNE JULY AUG. SEPT OCT. NOV. DEC.
1961
1962
1963
1964
1965

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	
JAN.	12.74	2.13	-	-	11.50	-	-
FEB.	12.20	2.51	2.11	-	12.17	5.35	-
MAR.	13.51	0.49	0.31	-	9.17	4.54	-
APR.	13.08	1.00	0.79	4.17	14.28	7.06	-
MAY	13.02	2.75	-	-	14.10	5.85	-
JUNE	13.08	5.00	-	5.85	11.93	-	*134.96
JULY	13.51	3.94	-	0.72	11.80	-	**
AUG.	13.51	10.12	-	3.36	12.70	-	**
SEPT.	13.08	3.95	-	-	12.50	5.04	**
OCT.	13.51	2.79	2.17	3.12	10.07	4.73	+ 36.87
NOV.	13.08	-	-	2.96	-	-	83.70
DEC.	15.69	-	-	-	-	-	155.06
TOTAL	160.01	-	-	20.18	-	-	-
AVG.	13.33	3.47	1.34	3.36	12.02	5.43	-

* 20 days data. Meter returned to service
** By-passing meter
\+ Readings for eight days

COMMENTS

During 1965, 160,000 cubic feet of raw sludge was pumped to the digesters. This sludge had an average solids content of 3.47 percent equivalent to a total of 347,000 pounds of solids of which 270,000 pounds were volatile.

A total of 20,180 cubic feet of digested sludge was removed from the digesters. This was equivalent to 151,200 pounds of total solids and 68,000 pounds of volatile solids. The amount of volatile matter destroyed was 202,000 pounds.

Gas production figures are incomplete since the gas meter was sent to the manufacturer for overhauling.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	12.19	1380	11.32
FEBRUARY	17.18	1197	6.97
MARCH	25.62	1331	5.20
APRIL	25.83	1120	4.34
MAY	17.70	1267	7.16
JUNE	13.64	1286	9.43
JULY	15.84	1274	8.23
AUGUST	14.01	1278	9.12
SEPTEMBER	13.77	1280	9.30
OCTOBER	13.25	1297	9.79
NOVEMBER	20.55	1185	5.77
DECEMBER	25.65	1404	5.47
TOTAL	214.87	15299	-
AVERAGE	17.91	1275	7.12

COMMENTS

Continous chlorination of the effluent was practised at this plant in 1965 for disinfection purposes. An average dosage of 7.12 ppm chlorine was required to obtain the OWRC objective of 0.5 ppm chlorine residual after a 15 minute contact period.

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RECOMMENDATIONS

1. It is recommended that primary effluent be utilized as a water source for operation of the chlorinator and the watering of the grass at the plant site.

2. The Town of Trenton should continue its program of eliminating storm water from entering the sanitary sewers.


ONTARIO WATER RESOURCES COMMISSION